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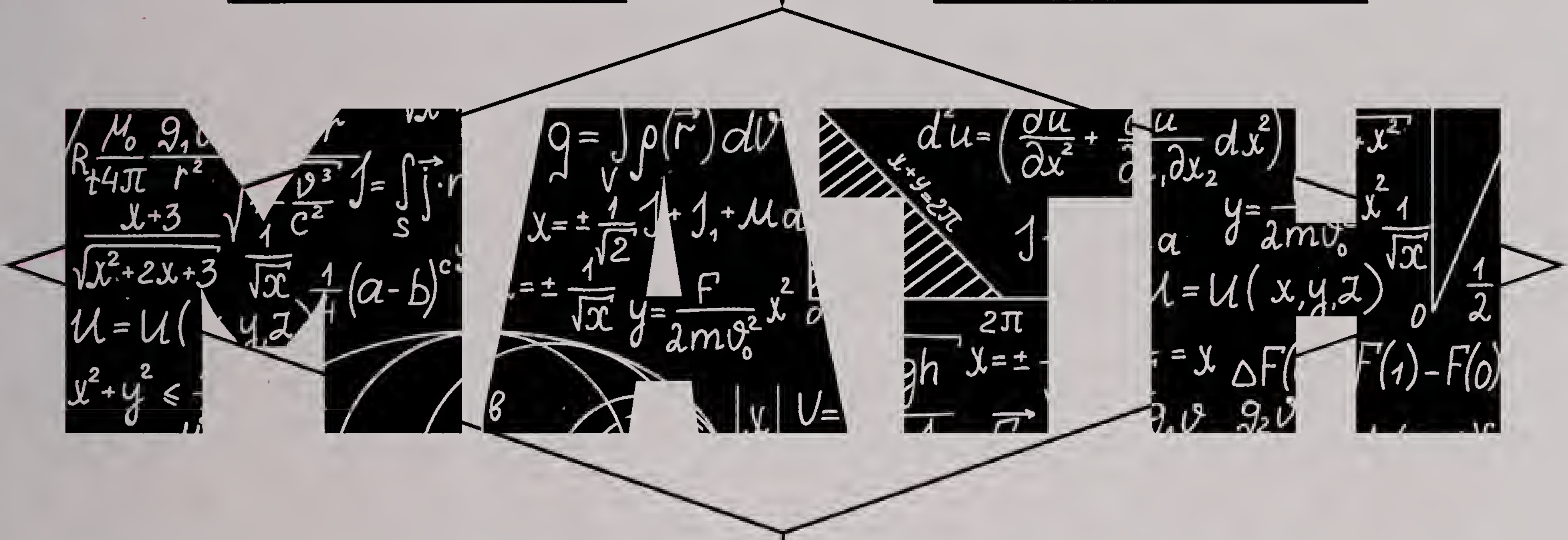
THE NEW MATH for CIOs



Today's **data-driven** business runs on the **almighty algorithm**. Yet those **geeky equations** can stir up legal and ethical trouble. **20**

BY KIM S. NASH

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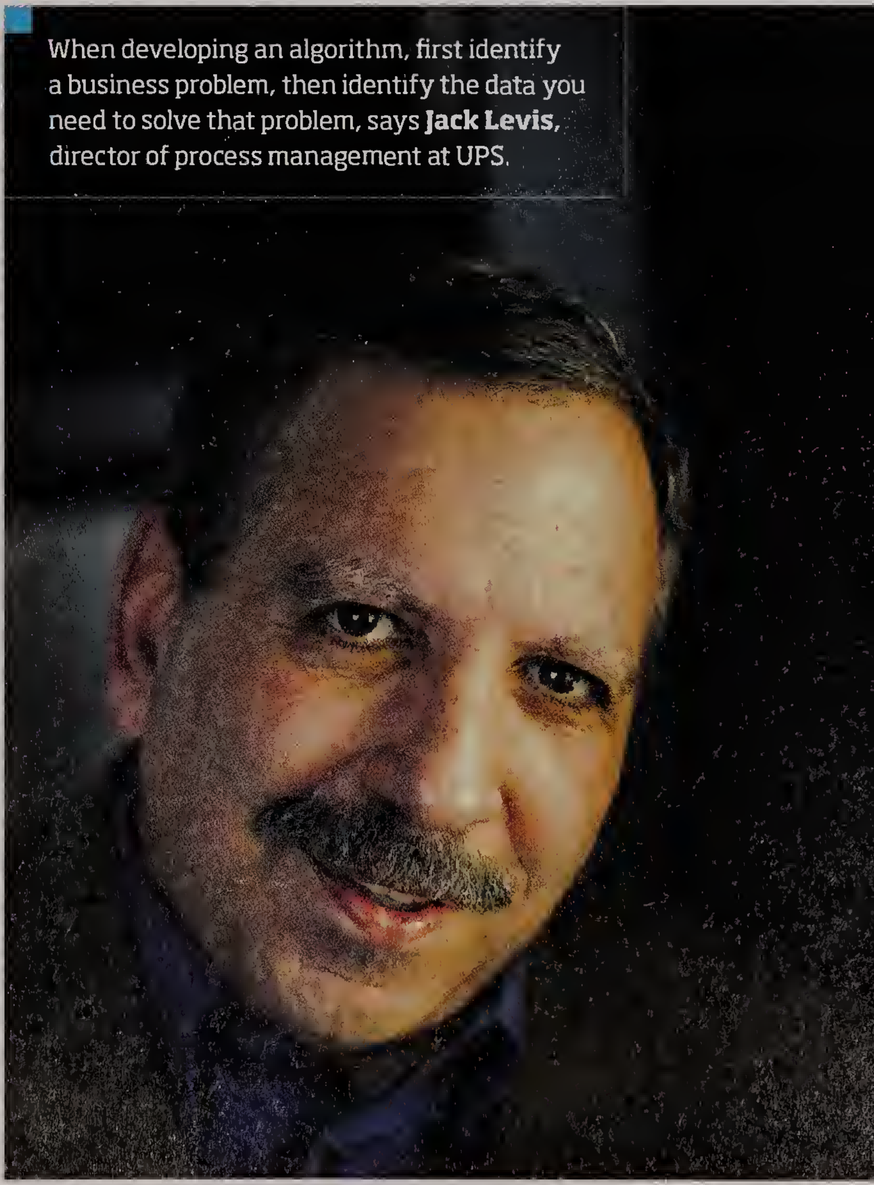
The New Math for CIOs **20**

COVER STORY Today's data-driven business runs on the almighty algorithm. Yet those geeky equations can stir up legal and ethical trouble.

BY KIM S. NASH



When developing an algorithm, first identify a business problem, then identify the data you need to solve that problem, says **Jack Levis,** director of process management at UPS.

FROM THE
EDITOR IN CHIEF

Mighty Algorithms

As a big sucker for the phrase "recommended for you," I am quite possibly the ideal online shopper. (My other trigger words are "free shipping" and "special clearance.") Given my profession and the number of CIOs I interview, I'm also well aware that all manner of fascinating data analysis is bubbling away in the database cauldrons of my favorite shopping sites.

But algorithms? The very word strikes an uneasy chord in the heart of anyone who is, to put it kindly, mathematically challenged. When my editors first proposed the story that you see on our cover ("The New Math for CIOs," page 20), I wondered what on earth we might say about these undercover math equations that merited attention from our CIO readers.

Quite a lot, as it turned out.

The almighty algorithm is the fuel for today's data-driven businesses. They stoke the data engines that recommend purchases, trade stocks, predict crime, spot medical conditions, monitor sleep apnea, find dating partners, calculate driving routes and so much more. "These math equations," writes Managing Editor Kim S. Nash, "may someday run our lives."

In the wrong application, they may someday ruin lives, as well.

The fascinating story that Nash unearthed will show you exactly why CIOs need to develop what one expert called "algorithmic accountability." Understanding a few of the basic concepts used to build algorithms (no math degree required) could save your company from legal liability, poor business results or bad press.

Uber learned that the hard way. The taxi disrupter uses an algorithm that jacks up prices when demand is high. That nifty set of equations was only doing its job last December in Sydney, Australia, when it quadrupled the rates for terrified people fleeing a café under siege by an Iranian gunman. Uber apologized afterwards and refunded fares.

Our story also delves into the business upsides of algorithms at companies like UPS, H&R Block and eHarmony. And it makes the strongest case of all for IT leaders to think more deeply about business ethics and practices, rather than merely creating the data-handling systems that feed the algorithms. CIOs should understand the way data is being defined, monitored and manipulated in these systems.

My recommendation for you? Read this story and then go have a friendly chat with your best data engineer. Then you'll understand why the almighty algorithm merits your attention.

Maryfran Johnson

Maryfran Johnson, Editor in Chief, *CIO* Magazine & Events
mfjohnson@cio.com

CHATTER

'Stop That Bickering!'

Surveys continue to show that many **chief marketing officers** and CIOs still don't cooperate very well. "I see so much energy being wasted on **political battles** . . . where people feel **threatened** or their territory is being taken away," says Michael Broberg, a vice president at Hitachi Consulting. Does the **CEO need to step in** to put an end to the bickering? "Definitely," he says, "in a way that's very visible."
www.cio.com/article/2870809/

Smarter Factories

Smart homes and fitness gadgets get all the attention, but the **Internet of Things** may be even more powerful in **industrial settings**. For example, Airbus Group is prototyping the **"factory of the future"** with the help of vendor National Instruments (NI). "They're **reimagining** how to build airplanes," says NI executive Eric Starkloff. "They're **adding intelligence to their tools**, intelligence to their drills and fastening machines. They're adding **robotic machines** that can work and interact side-by-side with humans."
www.cio.com/article/2872574/

Rose-Colored Glasses

CEOs have a **far more positive view** of the status and benefits of **data initiatives** than other execs in their organizations, according to a study by the Economist Intelligence Unit. "What I strongly suspect is the classic scenario where the CEO is always going to get the **rosiest picture painted** for him or her by the person below them," says Bill Franks, chief analytics officer of Teradata, which sponsored the report. But Franks cautions that managers closest to the data **see the "warts" daily** and may be **overly pessimistic**.
www.cio.com/article/2873612/

Have a comment about a story in this issue? Go to *www.cio.com/magazine* or write to *letters@cio.com*.

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FROM THE
PUBLISHER

Security Mindshift

How strategic is IT security to you and your enterprise? Our 2015 State of the CIO research, published in January, tells us that it's certainly climbing up your priority list. Even more significantly, it's higher on your CEO's list, too.

In our 14th annual survey, we asked 558 IT leaders about top business and technology priorities, salary ranges, tenure in the job and much more. The good news was that CIOs are on a solid career footing overall, with almost half of you reporting to the CEO. The average CIO tenure is inching up close to the six-year mark, and two-thirds of you sit on the executive committee.

But what stood out most to me was how much time you must now devote to security and risk management initiatives as compared to last year. We saw a 7 percent jump in the amount of your daily activities spent on security versus other duties. The only other area that experienced that much of a percentage gain fell under the category of "leading change efforts."

This sharper security focus makes a lot sense when you think about it.

With the move to the so-called 'third platform' technologies (social, mobile, analytics and cloud) as primary drivers of business transformation, the cybersecurity risk factors continue to escalate. Yet it's harder than ever to find and hire security and risk management professionals. They took the No. 2 spot on our list of top skills shortages for this year (right behind data analytics experts).

Security has clearly become as much of a business concern as an IT responsibility. With the headline-grabbing breaches at Target, Home Depot, Sony Pictures and others, CEOs and their boards are hyper-aware of the reputational damage that follows a breach. Upgrading IT security to avoid cyberattacks jumped up the list of the CEO's top 10 priorities in our survey, from eighth place to fourth place.

I was recently talking with the CIO of a large automobile manufacturer's finance division. He told me that his CEO said he'd be more inclined to miss a shareholder meeting than to skip an enterprise risk meeting with the CIO and the CSO.

So, how strategic has security become for you? Is it taking up more of your time and budget? I'd love to hear about your experiences, so drop me a line and I'll send you a copy of our complete State of the CIO report.

Adam Dennison

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PHOTO BY LYNN HOLMLUND

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Fighting Fires From the Cloud

To battle wildfires, California field crews use mobile devices to access digital images and data streams

BY MARY K. PRATT

Crews responding to California wildfires can now access aerial photos, stats on ground moisture and wind, and other data to help them plan their attacks.

Fires shift character as they grow and recede, and the data helps firefighters and their supporting logistics teams respond as effectively as possible, says Tim Garza, director of IT at the California Natural Resources Agency, which makes the data available via a private cloud. “Fires aren’t static, so they have to make decisions on the spot, [like] where are they going to cut the flames off and where are they going to try to redirect it,” he says.

Other state agencies and citizens can also get current and historical data from the agency’s private cloud. For example, decades of data on water flows, soil erosion and climate change help manage water during droughts. A farmer can gather rainfall and groundwater statistics to help make planting decisions.

“The whole idea is that the information isn’t locked away,” Garza says. Prior to the new ▸▸▸

ILLUSTRATION BY LISA ADAMS

•••••••••••• **$40,000/hour Estimated cost of outages caused by distributed denial-of-service attacks (which typically last 6 to 24 hours)** Incapsula ••••••••••

▸▸▸ **Fighting Fires** Continued from page 8

system, because data storage capacity was limited, only current information was available and historical data was kept on tapes, he says. People didn't know where data was or if it existed, he says. "It was cumbersome."

California is among several states embarking on an "open data" push to make statistics, maps and other information publicly available for citizens, programmers and others to see and use. A portal of state financial data opened last year, and a website that offers data from 131 agencies on schools, transportation, air quality, political contributions and more continues to grow.

The California Natural Resources Agency system consolidated 30 data centers and server rooms into one and aggregates data from separate departments and state organizations so it's easier to parse. Garza's team used NetApp tools for storage and to cordon off parts of the private cloud so that sensitive information can't be accessed without appropriate authorization. The IT work has had significant impact on employees' productivity, he says. Firefighters use smartphones and ruggedized laptops to access the data in the field. The cloud, along with the apps and portals to access it, he says, "allows them to have logistical support on the ground in real time."

> **"The whole idea is that information isn't locked away."**
>
> –Tim Garza, director of IT, California Natural Resources Agency

When they aren't responding to fires, firefighters can analyze large data sets containing current and historical records to identify danger zones and take preventive measures, such as clearing brush.

Forrester Research analyst Henry Baltazar says storage technology is critical for making data available in a reliable way, and for protecting it. IT leaders must think carefully about how best to store data in a private cloud, based on how constituents will use it. Storage tools can help manage server workload by moving data around as needed, he says.

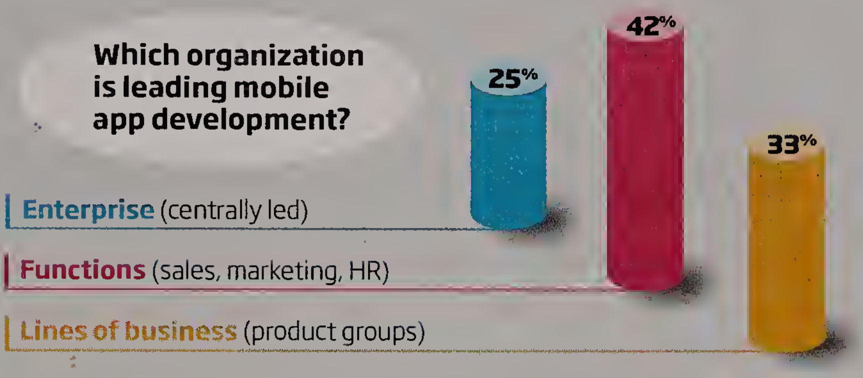
"You create this pool of resources that you can give to any business stakeholder when they need it," Baltazar says. "That's what people are trying to get to."

Mary K. Pratt is a freelance writer based in Massachusetts.

crunch

Mobile Apps: Still Built in Silos

CIOs have high hopes that mobile apps can improve employee productivity and customer experiences, but they're frustrated by the lack of an enterprisewide mobile strategy



SOURCE: KINVEY ENTERPRISE MOBILITY SURVEY, NOVEMBER 2014

Twitter Gets Serious Roles In Hollywood

Twitter plays a big role in the entertainment industry, where it's much more than a delivery system for content, says David Herrin, head of research at United Talent Agency (UTA).

UTA uses Twitter analytics to predict box-office returns based on the performance of a film's social-media campaign for the 365 days leading up to its release.

The agency, whose clients include high-profile actors such as Paul Giamatti, Don Cheadle and Uma Thurman, started using Twitter data in 2011, mostly to provide raw numbers to its clients and movie studios.

While Hollywood agents may have "a reputation for being gunslingers" who shoot from the hip, "we really do rely on data now," says Brent Weinstein, UTA's head of digital media.

Twitter's data recently gave UTA the ammunition it needed to demand a pay increase for a client who stars in a hit TV show, says Weinstein, without naming names. The studio argued that the actor was a co-lead, not the lead character, but Twitter's data proved otherwise.

"This is a really powerful thing," says Weinstein. ***–Matt Kapko***

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CLUB PREMIER

Pitches That Hit the Target

BY STEPHANIE OVERBY

THE PROJECT :: Build a customer-centric data mart and deploy analytics to improve customer acquisition and partner profitability for a multicompany loyalty program.

THE BUSINESS CASE :: In 2010, AeroMexico spun off its frequent flier program to create Club Premier, a cooperative loyalty program jointly owned by the airline and loyalty company Aimia. Its members can "earn and burn" Premier Kilometers at more than 100 partners, including banks, retailers and travel service providers. Club Premier has collected a massive amount of data on its 3.3 million customers, from their favorite brands of liquor to when they like to shop for groceries.

"We have a lot of information from a lot of different sources, which opens up opportunities, but also creates a challenge," says Manuel Alejandro Sánchez Vega, Club Premier's CRM manager. The opportunity, and the challenge, is to figure out how to use that embarrassment of data riches to get a more complete picture of each member's behavior.

FIRST STEPS :: Club Premier had all member data in a single system, but it was built for transactional speed, not advanced analytics, and it did not store historical data. The company built a data mart organized by customer, not company or product. It had to standardize the transactional data coming from companies as varied as gas stations and luxury hotels. "They did not speak the same language," Sánchez Vega explains. It also used tools from vendor SAS Institute to create data flows extending from analytic results to the business processes that could do something with that data (such as email a specific offer).

Club Premier piloted customer analytics projects with several partners. Some, like a promotional experiment for liquor retailer La Europea, started very small. Executives at the family-owned company were not experienced in data analysis. Sánchez Vega and his team won them over by showing how a narrowly targeted, SKU-specific promotion to customers in a category likely to take advantage of a deal could have a big impact on sales. Indeed, La Europea saw its business from new customers within Club Premier jump from 20 percent to 30 percent.

Other partners, like financial services companies American Express and Banamex, were already advanced analytics users. So the goal with them was to prove the value of the customer intelligence Club Premier had gathered across a broad swath of industries.

WHAT THEY DISCOVERED :: Club Premier and its banking partners wanted to increase the number of members who had their jointly-branded credit cards, targeting those who would be the most active users. Big banks typically take a mass-marketing approach, but Sánchez Vega wanted to show them how Club Premier data could make it worthwhile to push the credit cards to small groups of people who were very likely to use them.

Last year, Sánchez Vega's team uncovered a segment of customers who shared characteristics with the most active existing credit card users (for example, they bought from the same stores, lived in the same areas, flew at the same rate, had similar gas consumption) and were therefore deemed likely to sign up for and use the credit card. It was a small pool, but to the surprise of the financial services companies, the acceptance rate was 60 percent. "We shared the offer with a much smaller population, but we were really certain that those members had the right profile," says Sánchez Vega. "It was a better response with less effort, and some of the [customer] acquisitions were totally new to the companies."

Stephanie Overby is a freelance writer based in Massachusetts.

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Reaching the Next Horizon

Merck's CIO transforms his role into a venture capitalist, ready to launch new, tech-enabled business lines **BY MARTHA HELLER**

The consulting firm McKinsey and Co. has a management framework called Three Horizons that's intended to help a mature company's C-suite "assess potential opportunities for growth without neglecting performance in the present." Horizon One includes the core products and markets that provide most of a company's revenue. Horizon Two covers emerging products and markets, and Horizon Three features products that will drive revenue in the future. Clark Golestani, CIO of Merck, has adapted McKinsey's model for his IT organization at the $44 billion pharmaceutical company.

CIOs, Golestani says, can use this Three Horizons model to understand their own roles. In the first horizon, the CIO acts as a CTO. "In the near term, the CIO should be driving performance up and cost out," Golestani says. "In this stage, the CIO is focusing on infrastructure and operations. If the first horizon isn't working well, it is hard for IT to move on to anything else."

A CIO who stabilizes the first horizon is free to move to the next one and play a new role: business strategist. "In the second horizon, the CIO functions as a business partner who is helping to grow revenue," says Golestani.

Some CIOs never make it to the second horizon, but those who succeed at that stage are ready for something more. "In the third horizon, the CIO acts as a venture capitalist," says Golestani. "This CIO is looking out beyond 36 months to envision the business's future."

CIOs who act like VCs spend time asking questions like these: How can we capitalize on the value that new technologies will bring to the business? How do we build a patented portfolio of IT processes and technologies that can be licensed and drive future value—beyond the business's core products? How do we carve out best-in-class capabilities and stand them up as new businesses?

Getting started in Horizon Three requires thinking like a CEO about the future of the business and becoming a student of the VC world.

Golestani has a team at Merck that is focusing on the third horizon. For example, he and the team have developed semantic analysis technologies that can discover intellectual property leakage and counterfeiting. "There are a large number of Web channels that sell pharmaceuticals," says Golestani. "But which ones are selling counterfeit drugs and which aren't? We are able to mine the Internet and find out."

Merck is turning this counterfeit discovery capability into an independent business (called Steelgate Intelligence Systems) serving the pharmaceutical industry and potentially companies in other markets that sell expensive goods.

Even innovations in how you manage the back office can turn into new businesses. At Merck, the IT team created an expense-processing app for the iPad that sits on top of an SAP system. "It takes all of the paper out of the process," Golestani says. "We could take that new capability, carve it out and license the technology."

It's fun to imagine how IT could create new business lines, but you'll need to hire IT people who have entrepreneurial skills. "Your team needs to know how to create new businesses, structure them, the legal aspects, accounting, negotiation and more," he says. "That's what we've done here. We have Wall Street executives, high-tech executives, business development people, financial professionals and people with backgrounds in branding and marketing."

Getting started in Horizon Three requires thinking like a CEO about the future of the business, becoming a student of the venture-capital world and then trying a small venture deal. "Demonstrate how you can create value on a small scale," Golestani says, "and your CEO will listen."

Martha Heller is president of executive recruiting firm Heller Search Associates and author of *The CIO Paradox*. Follow her on Twitter: *@marthaheller*.

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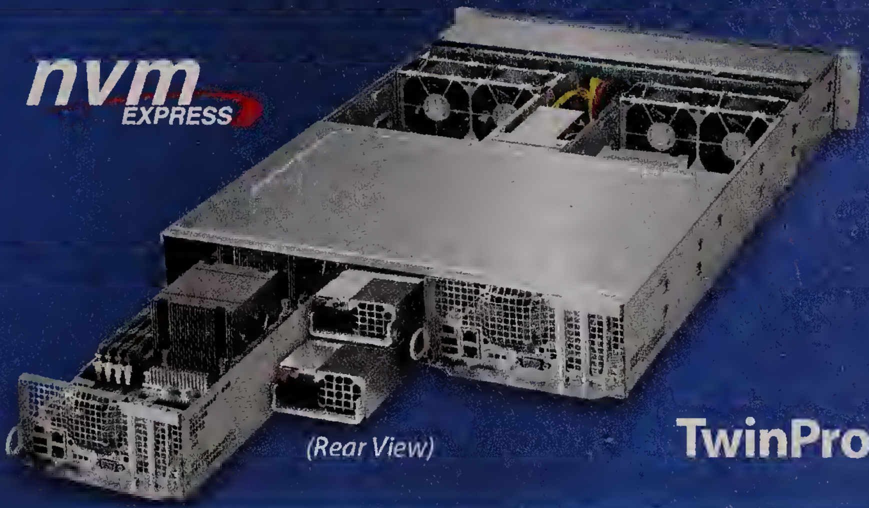

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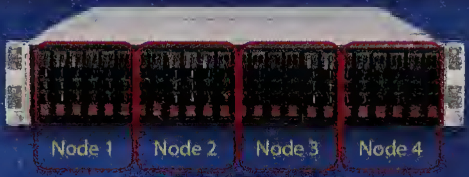

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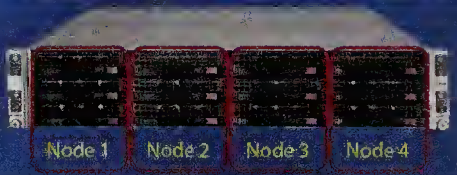

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When Backup Is a Disaster

A utility company learns the value of a coherent disaster recovery plan

BY STEPHANIE OVERBY

Shortly after Branndon Kelley joined American Municipal Power (AMP) as CIO, the company's financial system went down.

It took four days to restore the system and Kelley, who had previously consulted with state governments on business continuity issues, immediately started exploring AMP's backup and recovery strategy.

He quickly discovered that there was none. No coherent plan. "We had a whole bag of tricks," Kelley says, including more than 10 different backup systems and processes. There were outdated off-the-shelf packages and hand-coded scripts—none of them documented or interconnected. There were backups of backups, and fewer than half of the backups succeeded on the first try.

That's when Kelley started losing sleep. AMP, a nonprofit utility that provides electricity ▸▸▸

CIO **Branndon Kelley** overhauled AMP's backup and recovery process, replacing "a whole bag of tricks" with a single system.

PHOTO BY STEPHEN WEBSTER

▸▸▸ **Backup Disaster** Continued from page 14

to member utilities in several states, had begun acquiring and operating power plants, making the company's business continuity strategy especially critical.

"It made us feel uneasy because in the event that there was some sort of natural disaster or some kind of technical failure or even human error, it wasn't clear that we could continue operations," he says.

Trial by Fire

Kelley and his team documented the existing environment, gathered requirements, issued an RFP and chose a system from CommVault, which AMP implemented two months later, in November 2011. It wasn't the cheapest option, and the finance and executive committee made its displeasure over that fact clear.

"We have a competitive bid process, and I took some heat over that," Kelley says. But CommVault's system met all of AMP's requirements, providing, among other things, a single backup and recovery platform not just for IT systems but also for the company's plant operating technology (which was previously managed separately).

Within the first week, Kelley recalls, the new system "paid for itself for the next 10 years" during a surprise crisis: Recovery of the company's finance system was inadvertently started and then stopped at 3 p.m., in the middle of the monthly close, interrupting the system once again. A patch had been applied and an Oracle application stopped working, Kelley says.

"I'm sitting at my desk when I get the news, and I start thinking I need to pack my things," he recalls. "We're in the middle of the month-end close for October, heading into the new year. We've never done a recovery with the new software. I'm thinking the financial system will be down for days."

Kelley called CommVault. The vendor's database administrator started troubleshooting with AMP's DBA and the system was back online within a few hours. They lost just two hours out of finance's working day, lost and then recovered just 15 minutes work of transactions, and had the whole system restored by 9 p.m.

Today, 95 percent of backup jobs complete successfully on the first try and AMP has a 100 percent successful restore rate.

"It's hard to put a number on [the benefits]," says Kelley. "We've got a lot going on. We're busier than hell. As a 24/7 shop, backups used to literally keep me up at night. Now when a system goes down, I don't even hear about it. It's a commodity task, not a firefight."

Stephanie Overby is a freelance writer based in Massachusetts.

5 Things You Need to Know

HYBRID CLOUDS

1 THE DEFINITION VARIES. There's no consensus definition for what makes up a hybrid cloud environment, says IDC analyst Benjamin McGrath. "At the very least, it requires a mix of cloud and/or on-premises IT," he says. "But some would add the requirement for the entire environment to be managed under the same umbrella. And some would add a portability component, where workloads can shift across public and private clouds, or nonclouds, as needed." Hybrid clouds are more than just private and public cloud combinations, says Gartner analyst Ed Anderson. "Hybrid cloud is anytime you combine two or more clouds in a coordinated configuration," he says. Vendors like to position hybrid cloud as the combination of their private cloud offerings and their public cloud offerings, Anderson says, but that is "only a small subset of the possible hybrid cloud configurations."

• •

2 START PLANNING NOW. Whatever cloud technology it has today, a company is likely to end up with a hybrid cloud in the near future, Anderson says. "It's better to be proactive and establish a framework for hybrid cloud now, so as new cloud services are introduced to the environment they have a home," he says.

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3 THIS IS THE BIG LEAGUES. "Organizations with a hybrid cloud strategy are generally more advanced both in terms the people within the organization and the processes in which they engage with their technologies," McGrath says. "A hybrid cloud environment is the goal state for a lot of cloud-using organizations."

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4 MANY TOOLS ARE AVAILABLE. The tools to manage hybrid clouds come from many sources, including cloud management vendors, IT operations management vendors, pure-play cloud management startups and cloud service providers–which have their own tools for their platforms, Anderson says. "Organizations implementing hybrid cloud should consider their wide array of options, most likely including the IT operations management tools they are using today," he says.

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5 EXPECT MANAGEMENT CHALLENGES. Organizations that aspire to having a hybrid cloud strategy face big challenges because they must get to the point where they have a unified service catalog for IT resources and the ability to define cloud management policies and service-level agreements, McGrath says. "A lot of organizations have adopted some sort of cloud, or even some public and private clouds, and nearly everyone still runs some workloads on-premises," he says. "But the key to a hybrid cloud environment is being able to manage those different deployment options."

–Bob Violino

ANALYST VIEW

Put Customers at the Center

CIOs should focus on systems that deliver a great customer experience at every interaction **BY KYLE McNABB AND SHARYN LEAVER**

These days, the only source of competitive advantage is an obsession with understanding, interacting with, and serving today's empowered customers. Leading companies like Amazon.com, Macy's and Marriott are shifting their budgets, people and business structures toward customer knowledge, relationships and actions. Most of your business peers already know this: In our survey of 2,958 global business leaders, 74 percent of the respondents identified improving the customer experience as a high or critical priority in the next 12 months.

The good news? Customers are top of mind for business leaders. The bad news? Less than 50 percent of those polled said they trust the CIO and the IT team to deploy the systems necessary to improve the customer experience.

You need to understand which technologies best support customer-obsessed competitive advantage and then map those to the customer life cycle—the phases that a customer passes through in the course of an ongoing relationship with your company. These technologies fall into two categories:

- A next-generation CRM portfolio that supports continuous customer relationships. This includes systems for marketing, sales and fulfillment, customer service and product innovation.
- An engagement platform to deliver unified customer experiences. Your customers expect cohesive experiences for every contact with the company—from the mobile app to the contact center.

Want to see this in practice? Take a look at Home Depot and Hilton Worldwide, which are spending hundreds of millions of dollars to redefine customer engagement and increase customer loyalty. Look at Rolls-Royce, which digitized its products to redefine customer value, or Macy's and USAA, which have transformed their marketing and product strategies to focus on customers.

Customer obsession is easy to talk about but hard to do. It requires embracing the technologies that make customer obsession real and actionable. If you're standing on the sidelines waiting, now is the time to get in the game.

Kyle McNabb and Sharyn Leaver are vice presidents at Forrester Research.

NFL's Lions Tackle Giant Video Uploads

For NFL teams, the 17-week season can be grueling, with road trips, late-night games and press conferences. But for the Detroit Lions organization, the grind became a little easier when the team was able to speed up the process of sending huge HD video files to news stations.

In the past, the Lions used couriers to distribute copies of video footage to satellite media locations or relied on TV networks to distribute it to their affiliates. Neither method allowed the NFC North team to control the distribution.

"The broadcast business has changed dramatically," says Bryan Bender, director of broadcasting and production for the Lions. "Moving files around [was] difficult because of the size of HD files."

At the 2013 NFL draft, the Lions tested Signiant's Media Shuttle, a cloud-based file-sharing service. After press conferences and interviews, the team compressed and uploaded its video files, which are typically 1 to 3 gigabytes, within 5 to 10 minutes, a process that previously took a few hours. Using the new tool also eliminated the 20 to 30 minutes of travel time needed to transport video to satellite locations.

The Lions used Media Shuttle for the 2013 and 2014 regular seasons, including the game they played in London last October, Bender says. In addition to saving upload and travel time, the team can also distribute video footage more frequently and to more media outlets.

Bender says TV stations that can't send reporters to games are now able to download selected footage by logging in to Media Shuttle.

Another benefit: The Lions organization can see exactly which TV stations, local and national, downloaded video for use on their broadcasts.

"The [Lions] product and brand is getting out across more eyeballs than ever before," Bender says. "That's a huge value." *–Lauren Brousell*

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SAFEGUARDING YOUR SECURITY AND PRIVACY AT WORK AND AT HOME

Have a Safe Trip!

Experts say when you travel, staying "relaxed but alert" can help you anticipate and avoid trouble.

DAVID KATZ, CEO OF THE GLOBAL Security Group, leads classes on travel security and suggests that employees should maintain a state of "relaxed alertness" when traveling. He defines that as being aware of your surroundings and taking note of what is out of place. Katz also suggests a few small habits to keep your trip safe.

For example, if you go the same location repeatedly, vary your route. Leave each day at a different time. If you wouldn't wear your Cartier watch in the lower west side of Manhattan, don't flash it around a village in Bangladesh.

When booking a hotel room request a room on the third floor or below. Fire ladders don't go above the seventh floor, and if you have to jump, any jump that's more than three times your height can result in serious injury. Take a minute to find the emergency exits and the stairwells. Start at your door and count the doors to the exit; in case of a fire, you'll want to be able to get to that stairwell even if the smoke prevents you from seeing it. The hotel should have a secure well-lit parking lot that you can leave your vehicle in, and you should feel safe walking to that lot at night.

Katz suggests choosing a rental car with low mileage over a high-mileage vehicle–even if it isn't the type you prefer. You should also remove, or ask the rental company to remove, any stickers or other markings on the car that signal it's a rental. There's no need to identify yourself as a visitor who may be unfamiliar with his surroundings (and an easy target for a thief).

Finally, employees should always leave a copy of their travel itinerary both at home and in the office. Make arrangements for regular check-in calls at home and work. If you fail to call, your co-workers and family will know to follow up.

DID YOU KNOW?

The 10 Most Dangerous Cities in the U.S.

International travel is not the only time that business travelers need to be aware of safety issues. Based on murder, rape, robbery, aggravated assault, burglary and motor vehicle theft rates the following U.S. cities were ranked as the most dangerous in 2006

1. St. Louis, MO
2. Detroit, MI
3. Flint, MI
4. Compton, CA
5. Camden, NJ
6. Birmingham, AL
7. Cleveland, OH
8. Oakland, CA
9. Youngstown, OH
10. Gary, IN

Source: Morgan Quitno Press' 2006 Safest and Most Dangerous Cities Survey

FALL 2007 Security Smart 1

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CSO
BUSINESS RISK LEADERSHIP

Yamaha Sets Sights on Innovation

Seeking to shift IT staffers away from maintenance tasks to high-value initiatives, Yamaha moves to the public cloud **BY THOR OLAVSRUD**

Yamaha Corporation of America, a maker of musical instruments and audiovisual gear, has joined the ranks of midsize enterprises ditching their data centers and going all-in with a public cloud infrastructure. Well, almost. Its Oracle ERP and Cisco voice systems remain on-premises for now.

The company previously had a data center hosted by AT&T, says Vimal Thomas, vice president of Yamaha's IT division. But at the end of 2012, Thomas decided something needed to change. His team was wasting money, buying 30 percent more capacity than necessary in order to guarantee performance and uptime, but what hurt the most was the inefficient allocation of staff, Thomas says.

"We need our IT people spending 70 percent of their time on new initiatives and only 30 percent on routine maintenance activities, yet that wasn't happening," he says.

Yamaha leased servers on a 30-month cycle. But with nearly 200 servers, the task of cycling old servers out of the data center and setting up new ones required the equivalent of one and a half full-time IT professionals.

In late 2012, Yamaha issued an RFP for outsourcing the whole process, Thomas says, but "the quotes that we got back to do what we were doing were huge."

The company then decided to move its systems to the cloud. It sent out another round of RFPs to six providers of cloud-based services. After six to eight months of evaluation, Yamaha chose Amazon Web Services (AWS) and got expert help from 2nd Watch, an AWS consulting partner.

The two companies began working together in October 2013 and faced a time crunch from the outset. Thomas wanted to finish the migration quickly so his staff could focus on upgrading Yamaha's Oracle ERP system to R12.

"They had to take us from start to finish without any hiccups. Any hiccup would have interrupted a much bigger project," Thomas says.

The development and testing systems were the first to migrate, but production workloads followed soon after. And there were no hiccups. By August 2014, all production systems (aside from the Oracle and Cisco voice systems) had been moved to the cloud.

There were some uncertainties about how Oracle would run on AWS, so Yamaha decided to keep the ERP system in-house, though Thomas says he hopes to migrate it as well within the next year or so.

Yamaha has projected annual savings of $500,000. But for Thomas, the cost savings pale in comparison with the ability to get his IT team focused on initiatives that bring more value to the business.

Thor Olavsrud, a senior writer at CIO.com, covers security, big data and servers.

Cloud and On-site Software Vendors Duke it Out

Fierce competition between providers of hosted and on-site software will lead to more price cuts this year, according to market research firm Gartner.

In the customer relationship management market, a key cloud battleground, per-seat prices for tools that handle tasks such as salesforce automation are expected to decline in the next 12 months and ultimately fall by 25 percent through 2018, Gartner says.

Incumbent vendors will heavily discount their cloud offerings to try to prevent their existing on-site customers from defecting to companies such as Salesforce.com and SugarCRM.

Enterprises will also benefit from increased price competition in other areas, such as the database management, application infrastructure and middleware markets. However, the price competition in these sectors isn't quite as ferocious.

Amazon Web Services, Google and Microsoft are locked in a price war over the cost of public cloud services. At the same time, old-school vendors such as IBM, Hewlett-Packard and Microsoft are pushing hybrid clouds, which integrate public clouds with software running in enterprise data centers.

These developments won't just result in lower prices; they will also yield better management tools and improved security, Gartner says.

As they migrate to the cloud, many enterprises are hiring consultants to provide guidance and help them select vendors and services, according to a study by Technology Business Research, making those firms a highly influential "entry point" to the cloud market.

As enterprises increasingly choose cloud-based services over software that they run in their own data centers, there will be repercussions in other IT markets. For example, Gartner says server and storage sales won't grow as much as previously thought this year, but spending on networking hardware will likely increase faster than expected. *–Mikael Ricknäs*

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THE NEW MATH for CIOs

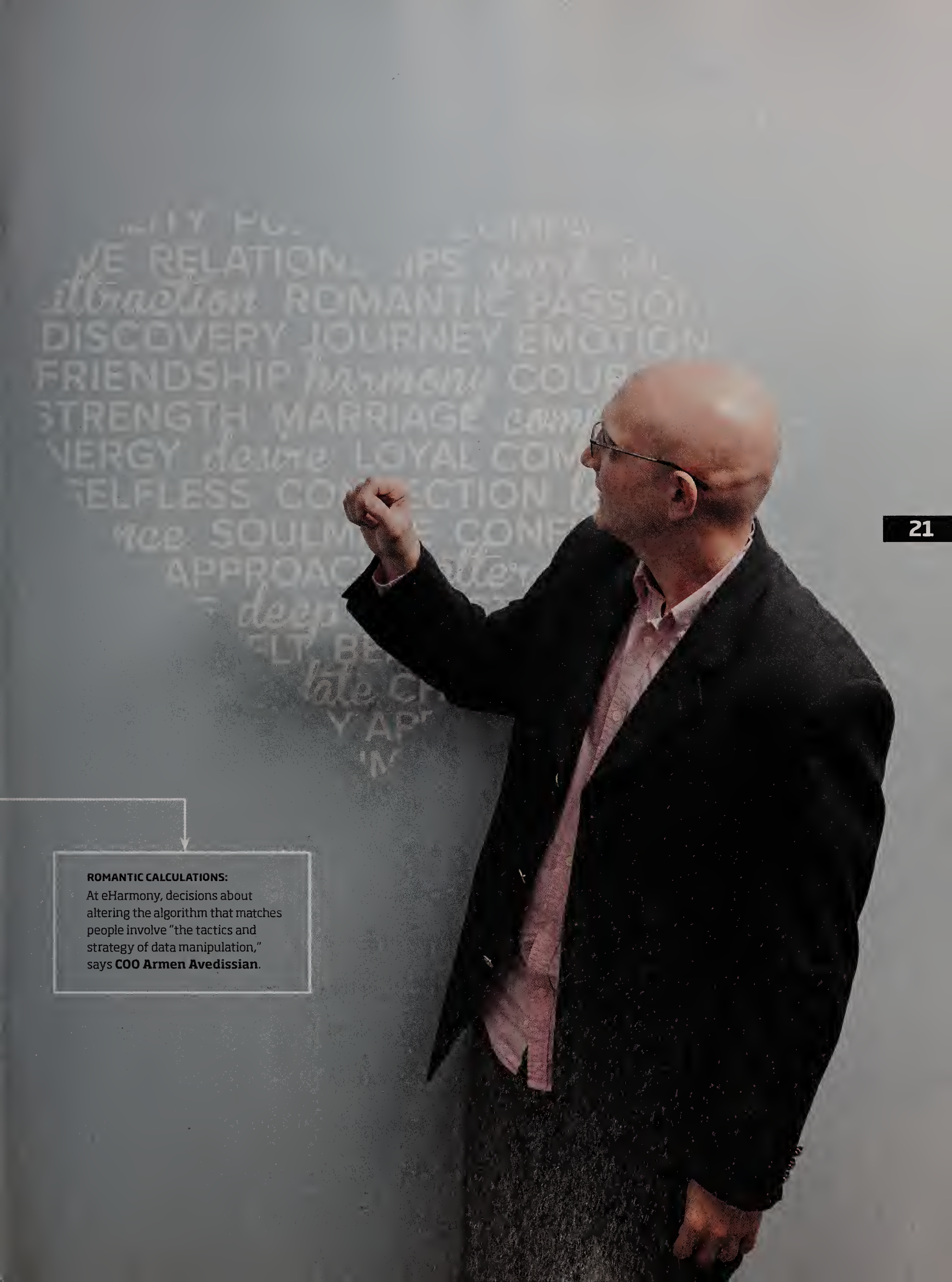
Today's **data-driven** business runs on the **almighty algorithm**. Yet those **geeky equations** can stir up legal and ethical trouble.

BY KIM S. NASH

We're used to algorithms recommending books, movies, music and websites. Algorithms also trade stocks and predict crime, identify diabetics and monitor sleep apnea, find dates (and babysitters), calculate routes and assess your driving, and even build other algorithms. These math equations, which can reach thousands of pages of code and routinely crunch hundreds of variables, may someday run our lives. Companies increasingly use them to run the digital business and gain competitive advantage.

Unleashing an algorithm can lead to new customers and revenue, but it can also bring encounters with ethical and legal trouble. Already, consumer advocates and regulators are training their sights on the dark side of the algorithm revolution, such as creepy over-personalization and the potential for illegal price discrimination. As CEOs look to chief digital officers and data scientists to conquer the next frontier, CIOs have sometimes been on the sidelines, whether by choice or default. But as business leaders, CIOs may now have to elbow into meetings where Ph.D.s, corporate lawyers and other colleagues are talking about the data-driven future. CIOs need to join those conversations to help steer company strategy, certainly, but

PHOTO BY DANIEL HENNESSY



ROMANTIC CALCULATIONS: At eHarmony, decisions about altering the algorithm that matches people involve "the tactics and strategy of data manipulation," says **COO Armen Avedissian**.

also to contribute to decisions about what data to pour into an algorithm and what to keep out, and how to monitor what the algorithm does.

That includes devising a defensible policy for handling the information produced, says Frank Pasquale, a professor of law at the University of Maryland. "Algorithmic accountability" will become part of the IT leader's job, he says.

That realization can hurt. Athena Capital Research, a high-frequency stock trader, used a proprietary algorithm called Gravy to slip in big buy and sell orders milliseconds before the NASDAQ exchange closed for the day in order to push stock prices higher or lower, to Athena's advantage. The Securities and Exchange Commission viewed that as illegal manipulation and last year called out Athena's CTO for helping other managers plot the most effective use of Gravy during at least six months in 2009. Athena settled the case for $1 million.

No one says CIOs must delve into Ph.D.-level math. But a working knowledge of basic concepts behind algorithms can help avoid bad results and bad press. "Algorithms allow us to get rid of biases we thought were there in human decision-making," says Michael Luca, an assistant professor at Harvard Business School. "But pitfalls are equally important to think about."

MATH MAGIC

Algorithms can be used to make operations more efficient, answer "what if" questions and make new products and services possible. At United Parcel Service, the 1,000-page Orion algorithm does all of that. In 2003, UPS started building Orion (for On-Road Integrated Optimization and Navigation) to optimize delivery routes. You might have six errands to do on a given day. A UPS driver has about 120. The company wanted to save time and fuel by having drivers follow the most efficient routes possible while still making deliveries on time, says Jack Levis, director of process management. Levis oversees Orion and the team of 700 engineers, mathematicians and others who support it.

Cutting just one mile per driver per day saves $50 million per year, Levis says, and Orion has so far saved seven to eight miles per driver per day. UPS is on track to save $300 million to $400 million per year in gas and other costs by 2017.

The most important thing any manager can do when embarking on an algorithm project is to "work backwards," Levis says. That is, define carefully what business decisions the company struggles with, then identify what knowledge would help—what information you'd need to teach you the knowledge you

A **PROFITABLE** FORMULA

Companies use algorithms in all sorts of systems to make money or optimize operations, and sometimes both at once. Here's a sampling.

Putting the Squeeze On

Coca-Cola's Minute Maid division optimizes drink blends—especially orange juice—by understanding consumer preferences about factors such as mouth feel and pulp content. But operations variables are also figured in, including freight and labor costs. Coca-Cola wants to create not only juices that people will like, but also ones that work with the realities of its supply chain and production processes.

Who's Watching What?

Netflix knows that several people might share one household account, so it wants to be able to correctly guess who is using its video service and make appropriate recommendations without having to ask customers to identify themselves or answer questions during every visit. Toward that end, the company has developed an algorithm that analyzes patterns of customer behavior and alters movie suggestions based on certain variables. One is time of day. In the afternoon, the viewer is more likely to be a child. Late at night, an adult. In the future, the system might make gender and age assumptions based on how hard the customer hits buttons on the device he's using.

Shopping Around

Retailers have turned to algorithms to help solve the omnichannel puzzle. American Eagle Outfitters uses an algorithm to figure out how best to fulfill online orders with products shipped from physical stores. One goal: Focus on slow-moving products at low-volume stores that are within two days' shipping distance of online customers.

Monetizing Small Talk

MeetMe, an app vendor that matches members for mobile chats, has an "icebreaker algorithm" that uses quantitative data points, such as location, plus qualitative information, like self-declared interests in certain games, to suggest partners. This year, MeetMe plans to improve the relevance of its matches so people will spend more time chatting. Longer encounters mean more exposure to ads and more revenue for MeetMe.

Fasten Your Seatbelts

Auto insurers have long calculated premiums based on the number of miles someone drives, the customer's age, gender, marital status, vehicle type, driving record and home address. Now Allstate is fine-tuning that process with an algorithm that weights each risk factor differently. For example, the relative risk related to a 16-year-old driver could be triple that of someone age 30 to 50. But Allstate doesn't simply assume that all the miles a teenager drives are equally risky. Over the course of a year, for example, the miles driven at the start of a policy are probably riskier than the ones driven at the end because, of course, practice helps. So Allstate determines risk levels for both kinds of miles. However, there's a point at which learning slows down and each mile after that carries diminishing returns. The algorithm tries to find the point in the year at which that likely happens. *–K.S.N.*

IT introduces self-resolution IT

The new MyIT app enables employees to self-resolve tech issues via crowdsourced collaboration, reducing service desk calls by up to 92%.

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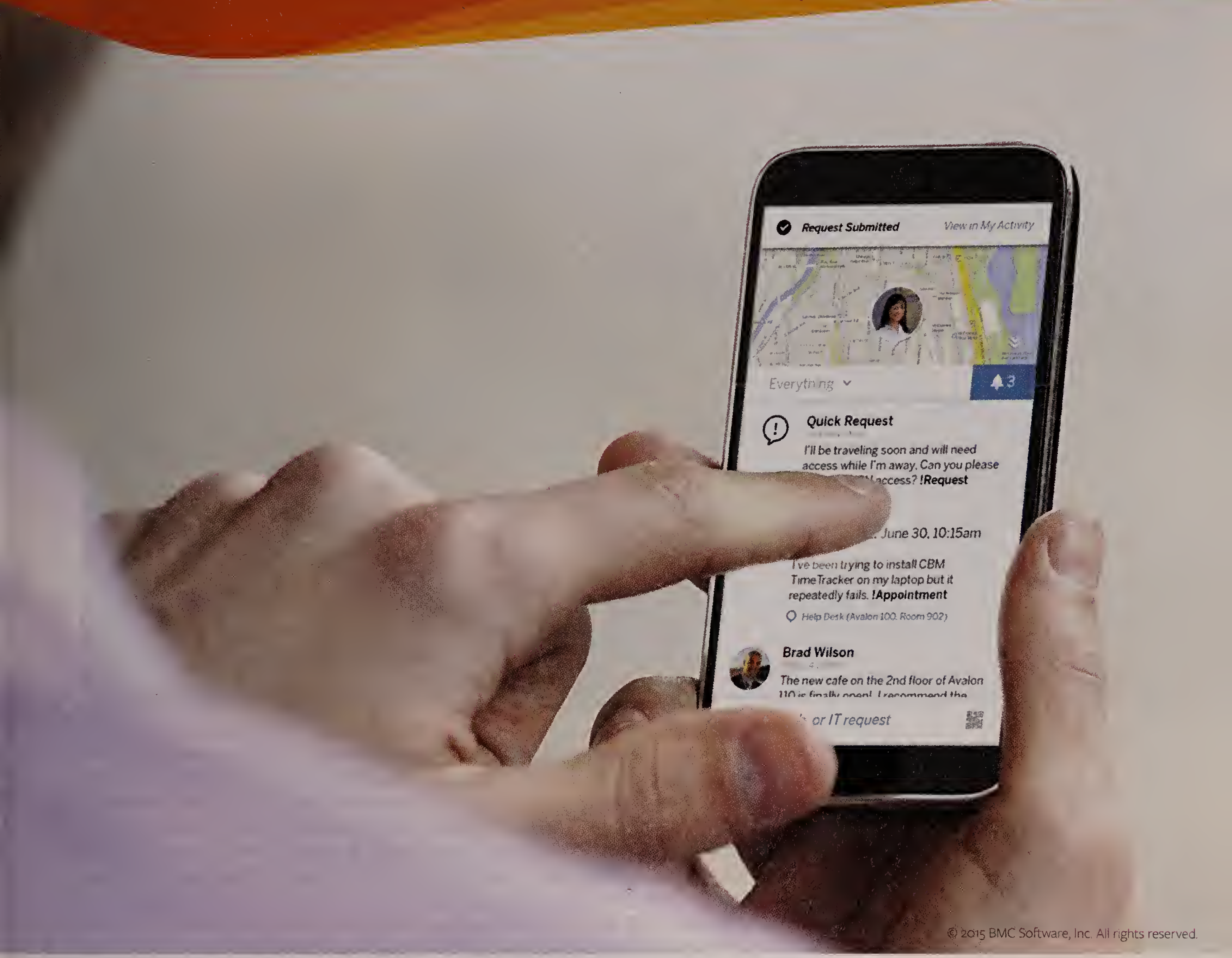
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When developing an algorithm, first identify a business problem, then identify the data you need to solve that problem, says **Jack Levis**, director of process management at UPS.

PHOTO BY CHRIS HARTLOVE

lack. Then identify the raw data that—when combined and teased apart and interpreted—would provide that information.

UPS spent nine years working on Orion before putting it into production, adding and subtracting data, testing, then adding and subtracting again. For example, at first Orion used publicly available maps. But they weren't detailed enough. So UPS drew its own, showing features such as a customer's half-mile driveway or a back alley that shaves time getting to a receiving dock—data points that Orion needs in order to plan how to get a package delivered by 10:30 a.m.

But an algorithm created by data scientists in a laboratory can't anticipate every factor or account for every nuance. Suppose a business customer typically receives one package per day. If Orion knows the package isn't tied to a certain delivery time, the algorithm might suggest dropping it off in the morning one day but in the afternoon the next, depending on the day's tasks. That might be the most efficient approach for UPS, but customers wouldn't know what to expect if delivery times changed frequently.

People don't like that amount of uncertainty, and it might have cost UPS business. Companies often take deliveries in the morning, go about their business during the day and then call UPS back to request a late-afternoon pickup of an outgoing package. If UPS pushed deliveries to the end of the day for efficiency's sake, it might not get that later call, Levis says. "We started realizing the rules we told the algorithm weren't as good as they should have been," he says. "We've learned you need to balance optimality with consistency."

The Orion team is outside IT, but Levis says the IT group built the production version of Orion and CIO Dave Barnes understands what Orion can and can't do, which is critical when he helps UPS devise business strategy. UPS's My Choice service, which notifies customers of pending deliveries and lets them change delivery times or locations, wouldn't be workable without Orion, Levis says. Not only does My Choice reduce multiple delivery attempts, it also brings in new revenue: 7 million customers have signed up for the service and pay $5 per change or $40 per year for unlimited changes. Next, UPS wants to bring it to other countries.

> "If algorithms are how you **run** your business and you haven't figured out how to **regulate** your algorithms, then by definition you're **losing control** of your business."
>
> –Alistair Croll, consultant and author of *Lean Analytics*

To grow new business from algorithmic insights, companies must look for correlations that competitors haven't spotted.

Take H&R Block, for example. In December, executives at the provider of tax filing software and services talked in detail with financial analysts about the company's new algorithm, which tailors marketing email messages and in-software pop-up boxes to individual customers. The company rolled it out this tax season, after starting algorithmic tests to quantify and categorize the behavior of 8,700 tax filers in an effort to predict what customers will do.

CMO Kathy Collins discussed how, for example, H&R Block may know that, based on past behavior, you're typically a February filer who prefers to interact with the company via mobile device. If you haven't filed by Feb. 10, the algorithm will suggest that someone nudge you with an email reminder and a discount on help preparing your return. Other customers may receive an email offer the week they receive their W-2 forms.

Over time, H&R Block expects to improve its algorithm by analyzing not only the content of customer tax returns but also the very clicks a taxpayer makes while using its software, said Jason Houseworth, president of global digital and product management. "In our case," he said, "the personal data is as rich as it gets."

The personalization made possible through the algorithm, Houseworth said, "will make each user feel that the software was not only designed for them, but is always a step ahead."

Some customers may like that, but others won't, says Pasquale, who wrote *The Black Box Society: The Secret Algorithms That Control Money and Information*. "There's so much pressure to know more. That's the arms race I fear."

The idea of knowing more about people is a driving force at eHarmony. The dating service matches members by their self-identified characteristics, such as hobbies and sexual orientation. But eHarmony also extrapolates what it calls unstated "deep psychological traits," such as curiosity, by putting answers to questionnaires through various formulas. A neural network also produces a "satisfaction estimator" to rate potential pairings, and the system learns over time, as members report back about their satisfaction with matches eHarmony suggests.

The company doesn't have a CIO; COO Armen Avedissian handles that role. Decisions about whether to change the algorithm are made by a team that includes Avedissian, CTO Thod Nguyen, vice president of matching Steve Carter and corpo-

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rate lawyers. "It's not just hardware and software but the tactics and strategy of data manipulation," Avedissian says.

The company looks at 29 dimensions of compatibility, such as "emotional energy" and "curiosity," each of which incorporates several variables collected through detailed questionnaires. More than 125TB of data is involved. The algorithm learns by assessing what a member does with each match that eHarmony suggests (contact right away? ignore?) as well as what feedback the members provide in questionnaires and open-ended responses. That data gets poured back into the equation and the cycle starts again, more informed, Avedissian says.

> "Almost every type of algorithm . . . will have an **ethical dimension** to it. CIOs need to have those **uncomfortable** conversations."
>
> –Michael Luca, assistant professor, Harvard Business School

The more relevant the matches, the higher the rate at which members will communicate with each other. The more they engage, the more likely they are to buy annual subscriptions. All the algorithms at eHarmony are intended to convert registrants into subscribers.

The dating service tests ideas by running slightly different algorithms for different customers, then measuring the rate at which registered members convert to annual subscribers. Risk and compliance teams run their own algorithms to see how the company's other algorithms are using sensitive data.

One recent discovery: Whether someone smokes and drinks turns out to be more important in dating in Europe compared to the United States. Once eHarmony more heavily weighted the smoking and drinking variables in its matching algorithm in the U.K., "business just took off," Avedissian says. Meaning, suggested matches were more on-target, therefore satisfaction increased—and so did conversion rates.

However, not all outcomes are expected.

UNINTENDED CONSEQUENCES

Uber is upending the taxi business with an app to connect passengers with rides and a proprietary algorithm that, in part, governs "surge pricing," which raises fares at times of heavy demand. Taxi associations from New York to Paris and back have protested Uber for cutting into their business, and government regulators have challenged the company on questions of fair pricing and safety. Even so, the darling of disruption has raked in an estimated $3.3 billion in investor funding.

In December, the cold, hard math collided with high emotion: Uber's algorithm automatically jacked up rates in Sydney, Australia, as people tried to get away from a downtown café where an armed man held 17 people hostage. Three people, including the gunman, died. Uber later apologized for raising fares, which reportedly were up to quadruple normal rates, and made refunds. "It's unfortunate that the perception is that Uber did something against the interests of the public," a local Uber manager said in a blog post. "We certainly did not intend to."

Problems are most likely to arise when algorithms make things happen automatically, without human intervention or oversight. Control is critical, says Alistair Croll, a consultant and author of *Lean Analytics: Use Data to Build a Better Startup Faster.* "If algorithms are how you run your business and you haven't figured out how to regulate your algorithms," he says, "then by definition you're losing control of your business."

Uber is working on a global policy to cap prices in times of disaster or emergency, a spokeswoman says.

Other unintended consequences involve the liability of knowing too much.

For example, say a hospital uses patient data to identify people who may be headed toward an illness, then calls them to schedule preventive care. If the math is imperfect, the hospital might overlook someone who later contracts an illness or dies. Or a whole group of people could get overlooked. "There's concern about who are the winners and losers and can the company stand by it later, when exposed," Pasquale says.

In another scenario, a company could open itself up to discrimination claims if it keeps too much data and insights about its employees, he says. Someone might be able to prove the company knew about, say, a health condition before letting him go.

Or if a car insurance company discovers there's a higher chance a customer will get into a crash after driving a certain number of miles, it may find itself in a "duty to warn" situation, Pasquale says. That's when a party is legally obligated to warn others of a potential hazard that they otherwise couldn't know about. It usually applies to manufacturers in product liability cases, or to mental health professionals in situations involving dangerous patients. And as the use of revelation-producing algorithms spreads, Pasquale says, people in other sectors could be subject to a similar standard—at least ethically, if not legally.

"At what point will things be a liability for you by knowing too much about your customers?" he asks.

Sometimes companies don't set out to uncover uncomfortable truths. They just happen upon them.

Insurance company executives, for example, should think carefully about results that could emerge from algorithms that help with policy decisions, says Croll, the consultant and author. That's true even when a formula looks at metadata—descriptions of customer data, not the data itself. For example, an algorithm could find that families of customers who had changed their first names were more likely to file claims for suicide, he speculates. Further analysis could conclude that it is likely those customers were transgender people who couldn't cope with their changes.

An algorithm that identified that pattern would have uncovered a financially valuable piece of information. But if it then suggested that an insurer turn down or charge higher premiums to applicants who had changed their first names, the company might appear to be guilty of discrimination if it did so, Croll says.

THE CIO'S BEST ROLE

The best way a CIO can support data science is to choose technologies and processes that keep data clean, current and available, says Chris Pouliot, vice president of data science at Lyft, a competitor of Uber. Before joining Lyft in 2013, Pouliot was director of algorithms and analytics at Netflix for five years and a statistician at Google.

CIOs should also create systems to monitor changes in how data is handled or defined that could throw off the algorithm, he says. Another key: CIOs should understand how best to use algorithms, even if they can't build algorithms of their own.

For example, if a payment service needs to figure out whether pending transactions could be fraudulent, it might hard-code an algorithm into its payment software. Or the algorithm could be run offline, with the results of the calculations applied after the transaction, potentially preventing future transactions. The CIO has to understand enough about what the service is and how the algorithm works to make such decisions, Pouliot says.

CIOs should, of course, provide the technology infrastructure to run corporate algorithms, and the data they require, says Mark Katz, CIO of the American Society of Composers, Authors and Publishers, which licenses, tracks and distributes royalties to songwriters, composers and music publishers.

Katz meets regularly with ASCAP's legal department to make sure the results of the algorithms comply with the organization's charter and pertinent regulations.

"We're all information brokers at the end of the day," he says.

CIOs can expect increasing scrutiny of analytics programs. The Federal Trade Commission, in particular, is watching the use of algorithms by banks, retailers and other companies that may inadvertently discriminate against poor people. An algorithm to advise a bank about home loans, for example, might unfairly predict that an applicant will default because certain characteristics about that person place him in a group of consumers where defaults are high.

Or online shoppers might be shown different prices based on criteria such as the devices they use to access an e-commerce site, as has happened with Home Depot, Orbitz and Travelocity. While companies may think of it as personalization, customers may see it as an unfair practice, Luca says.

The Consumer Federation of America recently expressed concern that, in the auto insurance industry, pricing optimization algorithms could violate state insurance regulations that require premiums to be based solely on risk factors, not profit considerations.

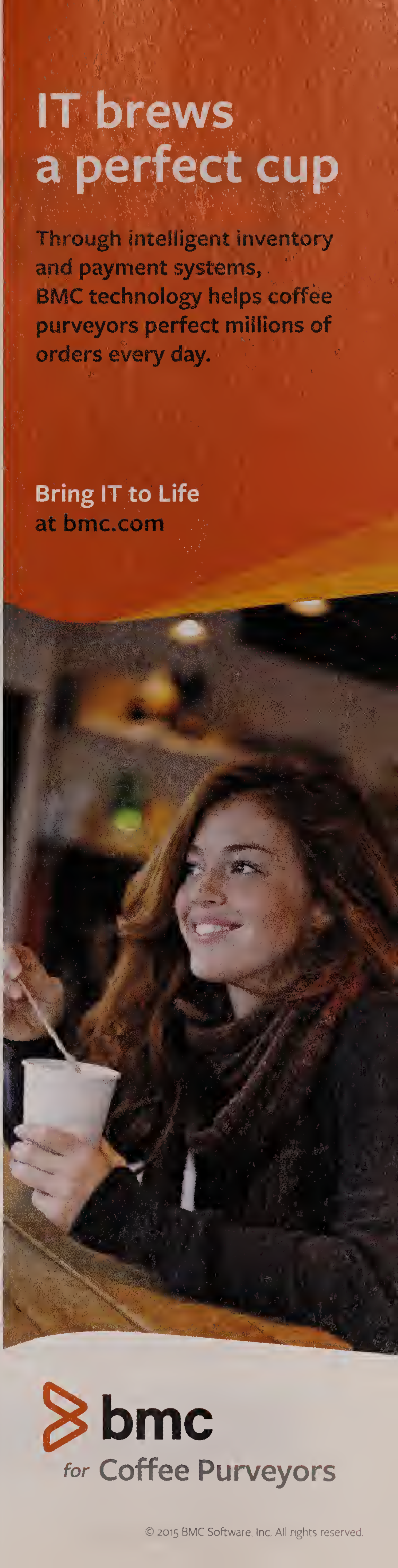
Consumers, regulators and judges might start asking exactly what's in your algorithm, and that's why algorithms need to be defensible. In a paper published last year in the *Boston College Law Review*, researchers Kate Crawford and Jason Schultz proposed a system of due process that would give consumers affected by data analytics the legal right to review and contest what algorithms decide.

The Obama administration recently called on civil rights and consumer protection agencies to expand their technical expertise so that they'll be able to identify "digital redlining" and go after it. In January, President Obama asked Congress to pass the Consumer Privacy Bill of Rights, which would give people more control over what companies can do with their personal data. The president proposed the same idea in 2012, but it hasn't moved forward.

Meanwhile, unrest among some consumers grows. "Customers don't like to think they are locked in some type of strategic game with stores," Pasquale says. CIOs should be wary when an algorithm suddenly produces outliers or patterns that deviate from the norm, he warns. Results that seem to disadvantage one group of people, he says, are also cause for concern. Even if regulators don't swoop in to audit the algorithms, customers may start to feel uneasy.

As Harvard's Luca puts it, "Almost every type of algorithm someone puts in place will have an ethical dimension to it. CIOs need to have those uncomfortable conversations." CIO

Contact Managing Editor Kim S. Nash at *knash@cio.com*. Follow her on Twitter: *@knash99*.



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To guarantee a great customer experience, these CIOs are collaborating with marketing and continually innovating

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LEARN TO COLLABORATE WITH MARKETING

Some of our most important customers are the 168,000 patients we serve at 2,119 kidney dialysis centers. Our goal is to make their interactions with us as easy as possible. We're working on mobile applications, pushing everything that's simple and answer-based to mobile devices.

When it comes to customer experience, you can't phone it in. We want all of our IT members to spend time in our clinics as much as possible because they come back with a much greater understanding of what our patients need.

We partner very closely with our marketing group on the patient experience. Marketers are innovative, creative thinkers, and I value that. If you want to work well with them, you've got to be open to looking at things differently but also help them ▸▸▸

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ILLUSTRATION BY SHUTTERSTOCK

▸▸▸ **The CX Factor** Continued from page 28

understand what IT needs in order to deliver a quality product. IT and marketing work together throughout the development cycle so that we can make changes to a product along the way.

We're building our mobile patient app in a modular fashion so we can easily take components out, move them around, and add new ones very quickly. That's an important architectural foundation when working with marketing.

MICHAEL DELPRIORE, CATALENT

DON'T STOP EVOLVING

One of our most important services is providing manufacturing, packaging, storage and distribution for pharmaceutical companies to speed R&D for new drugs. In addition to delivering physical material, information is a key part of our product, so any improvement to that is an improvement to the customer experience.

We have a number of customer-facing systems, including clinical supply management, clinical labeling and a customer information portal for clinical trial product supplies. The portal provides visibility into every aspect of the clinical process, from order status to real-time tracking of delivery for individual patient kits from our couriers. It is under continual development; the next feature will let customers review, edit and approve clinical labels online.

Because we work with over 1,000 customers, connecting into all those systems is a challenge. We have to remain flexible without creating 1,000 different ways of doing business. We also need to discern what will add value, through conversations with customers.

I have a team that works alongside the clinical supply business team that is dedicated to customer experience innovation, which is critical to our success. Our goal is to evolve alongside our customers, so we make sure we understand what's coming next for them and alert them to what's in our systems pipeline.

JOE ABIDAOUD, HUDBAY MINERALS

SEEK CONTINUOUS FEEDBACK THROUGH DATA

When you deliver a product like a base metal to a customer, there is little relationship beyond that point, so in IT we focus on improving the experience for our internal business partners.

When I came here in 2010, I introduced an annual IT user satisfaction survey, measuring service delivery, business alignment and whether our business has the technology it needs. By analyzing the data, we can focus our efforts on the business needs and develop an action plan. The data enables me to say to senior management and business unit leaders, "This is what our employees are saying, and this is where we need to invest."

For example, there was feedback suggesting that some of the network infrastructure supporting our mine operations was dated, which helped us move forward the timeline for replacing that hardware.

We get good and bad scores on occasion, but all data is good data, because it gives you the opportunity to address issues. Most IT staffers now rally behind the survey because it's one of our most powerful allies.

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More Than Mail

At the USPS, technology keeps mail relevant in an age of digital communications

BY JIM COCHRANE

The U.S. Postal Service has been a quiet leader in business technology for the past 40 years. Technology has enabled us—one of the largest employers in the country—to remain nimble and responsive to changes in customer trends and needs.

Our robust technology infrastructure has been the backbone of improving mail processing operations and reducing costs, but we're also harnessing data and analytics to stay ahead of the curve.

The CIO team is enabling this change throughout the organization, which—along with traditional IT, security and analytics—also includes engineering, research and development, and electronic mail entry and payment. This eclectic mix has allowed us to become change agents, delivering technology-supported products and operational savings.

The Postal Service delivers 40 percent of the world's physical mail volume, or 162 billion pieces of mail, catalogs and packages every year. We are at the core of an $800 billion industry, and the size and scope of our physical network is unmatched. However, our focus today is on keeping mail relevant in a world where people increasingly use digital communications. Digital marketing now competes with direct mail, bills are increasingly paid electronically, and even our traditional competitors are changing. One recent example is the USPS partnership with Amazon.com to provide package delivery on Sundays in a couple of thousand offices. To get this done, we built and delivered a dynamic routing capability from scratch in three months.

PHOTO COURTESY OF USPS

Technology is so interwoven into everything we do that the CIO team is now driving the pace of change. We've adopted agile practices and have torn down silos between departments. We continually bring together skills from all departments to put the best minds to work on the challenges we face.

Information has become nearly as important as the physical product—we maintain 33 petabytes of data storage, and there is a unique identifier on everything moving though our network, all the way to the mailbox. We have analytic capabilities to track where mail is, improve efficiency, predict workloads, understand customers, provide feedback, and deliver consistently reliable service.

Mail with a digital footprint is both measurable and predictable, so in addition to supporting our enterprise, we provide business-specific data to service partners, enabling them to plan their warehouse inventory, scheduling, call centers and day-to-day operations.

We're making the old new again. Our teams are designing mailboxes with electronic keys and Bluetooth technology for secure package delivery. They're designing delivery vehicles to handle higher volumes of packages and use alternative fuels. We've equipped our trucks with sensors to gather geospatial and maintenance information to optimize route efficiency. We're building out our social media capabilities to be more proactive about customer sentiment.

The USPS still ranks high in terms of how much people trust us, and we're committed to keeping it that way.

Jim Cochrane is EVP and CIO at the United States Postal Service. He is a member of the CIO Executive Council.

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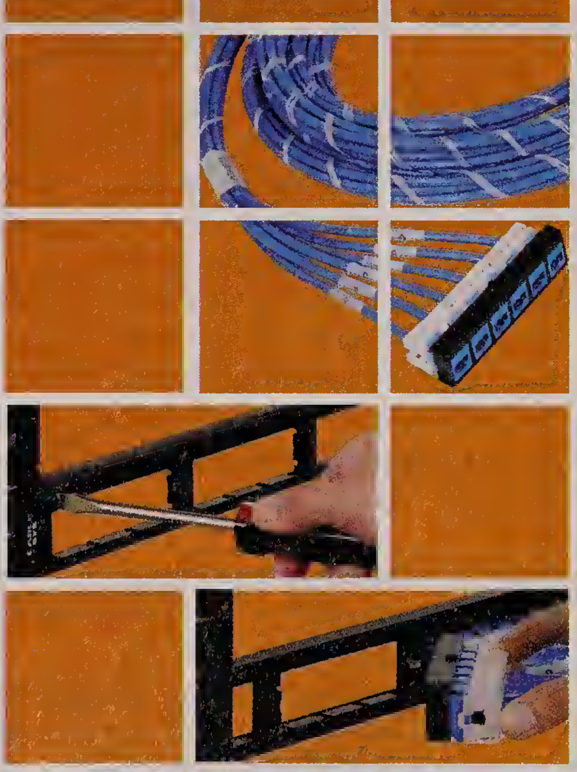

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IT as a Tennis Game-Changer

Fans, players, sponsors and coaches all benefit from IT, says Lewis Sherr, the U.S. Tennis Association's chief revenue officer **BY MARTHA HELLER**

What impact is technology having on the fan experience at the U.S. Open?
At the U.S. Open, we have tennis on 17 courts, and fans are able to stream play from other matches while they watch one live. This year, we had iBeacons on the grounds that allowed us to pinpoint the precise location of smartphones. As fans were walking around, we could invite them to see the new apparel at the Ralph Lauren store or come to an autograph signing at the Esurance booth.

We've gotten much more sophisticated in the data we can share with our sponsors.

We also put up digital social walls that showcased Twitter, Facebook and Instagram activity about the event. This allowed us to curate the fan perspective. That has opened up new opportunities for us and our partners to engage with fans.

What is technology doing for the fans at home?
We are seeing a lot of second-screen enhancements that really complement the broadcast viewing experience. This year, we developed the first predictive game in tennis, where fans could play alongside on their tablet as they were watching a match; if they guessed correctly who would win a point, they would accumulate credits and win prizes.

How are you using data to drive new revenue?
We've gotten much more sophisticated in the data we can share with our sponsors. We can give them nearly real-time data on the visibility generated, all over the world, from signs that surround the courts during the U.S. Open. We can precisely equate that visibility to media value to allow our sponsors to calculate the return on investment.

We are fortunate to have a very sophisticated IT organization that is constantly scouring the sports and entertainment world for new opportunities; they spend a lot of time with our business leaders to understand our needs.

Has technology changed the experience of the players?
We are seeing rackets with chips embedded in them that allow players to analyze their swings. We have technology on the court that shows whether a ball was in or out, and how far a player has run over the course of the match. We can understand the spin rates on balls, identify where on the court a player tends to make contact with the ball, pinpoint serve locations, and determine the optimal serve locations to generate winning points.

Tennis is an old game, but predictive analytics is a new discipline. How is the sport responding to this innovation?
Yes, tennis is a very established sport. But often, what is new and considered a luxury becomes a necessity after 24 hours. As players start to see their opponents using data analytics to help their performance, that ability suddenly becomes table stakes.

What one innovation has had the most impact on the game?
Our ability to use electronic line-calling during the U.S. Open, and to have that happen almost instantaneously, has absolutely changed the game. Now, players don't have arguments with officials over calls; the players, coaches and fans all accept that the data is precise and accurate. This is not instant replay, this is tracking software that maps the court and can show precisely where a ball has landed. This technology has had a profound impact.

Martha Heller is president of executive recruiting firm Heller Search Associates and author of *The CIO Paradox*. Follow her on Twitter: *@marthaheller*.

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CA based IT Co. has multiple openings at various levels at itsTorrance CA headquarter and unanticipated locations across the U.S. for: Software Developer. /Engr. to dev., create and modify computer applications software & specialized utility programs and customize software for clients Computer Prgmmr- convert & code project specifications Sys. Analyst,- analyze user requirements to automate & improve existing systems & computer systems capabilities ; analyze commercially available software like SAP/Oracle; Project Mng'r, Syst. Mn'gr.- Coordinate, direct project activities ;Bus. Anlyst-analyze business & other data processing problems for application to electronic data processing systems; Sys. Engr.- analyze, design, develop & test software apps. & test &debug computer programs; Mgm't. Anlyst- quantitative analysis, of bus. & investment information, work w/ financial information for bus & economic forecasts. Travel and/or relocate required to unanticipated client sites/ locations throughout the U.S. with expenses paid by employer. Please send resume with position desired to: Attn: HR, RJT Compuquest Inc., 23440 Hawthorne Blvd. Suite 210 Torrance CA 90505

For more details, contact us at:
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Financial JEE Software Developer in White Plains, NY. Required: Bachelor's (or a foreign equivalent) in Comp. Sci., IT or Soft. Eng. 5 years of experience as a Software/ Java Developer/Architect, 5 years of Java development experience; Knowledge of TIBCO, Object-Orientation, UML, Design Patterns and Software Architecture; Knowledge and understanding of business concepts related to Financial Risk Management (such as Mark to Market, Profit & Loss, price curve calculation, volatility surface) and Commodities Trading. Duties: design, build and maintain solutions for enterprise applications integration, application code, and proof of concepts for new technologies; develop applications related to financial risk management of commodities trading. Send CV to: E-Core IT Solutions, ATTN: M. Pegoraro, 50 Main Street, Ste 1000, White Plains, NY 10606. E-Core is an EOE.

Sr. Application Engineer, Constant Contact Inc. Waltham, MA. Dev & support Constant Contact's computer apps, automate tasks, & solve tech. issues. Analyze user needs & sw reqs to improve design of apps. Min Reqs: BS in Comp. Sci, Comp. Networking or rel field & 5 yrs exp. in lg scale sys mgmt, automation & tooling. Must have demonst. knowledge of mgmt sw Puppet, Chef & CF Engine; & proficiency w/ Perl, Python & Ruby. Mail resume to HR, CTCT, 1601 Trapelo Rd, Waltham, MA 02451 w/ ref. to Job Code: CC2223.

Senior Data Warehouse Specialist I: University of Massachusetts President's Office, (Shrewsbury, MA). Under direct supervision will support data reporting solutions, advancement of system capabilities, and BI programs including data marts and a data warehouse. Min reqs: BA in IT, Mgmt Info. Sys, Comp Sci., or rel. field. Must possess knowledge of: 1) D&D of data models, security, reports, dashboard, scheduler, and customization, as well as system admin of OBIEE and Cognos BI; and 2) Data analytics and data warehousing life cycle (collection to modeling) for student data or closely related data types.Mail resumes to David F. Estrella, HR Generalist, UMass President's Office, 333 South St., Ste 450, Shrewsbury, MA, 01545 w/ ref to Job Code: MA2015. No calls please.

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Tracking Hacking

The flu is out there, waiting to strike. You can catch the bug even if you shield yourself from germs, avoid sick co-workers and get a shot. But technology might be able to improve your odds of staying healthy: Flu Near You, a crowdsourcing website and mobile app, conveys data about your risk through a heat map showing the location—and severity—of symptoms. "Half the reason we don't understand the flu is because so much data is behind proprietary walls," says Mark Smolinski, director of the Skoll Global Threats Fund, one of the organizations that runs the site. Every week, Flu Near You surveys registered volunteers, asking them whether they're experiencing symptoms such as fever, fatigue or sore throat. It combines the data with information from the Centers for Disease Control and populates maps with red dots for a flu-like illness, yellow for symptoms and blue for no symptoms. The data is released to the public, so researchers and health organizations can also study the illness. The site and app provide information about where to get a flu shot by ZIP code, along with recent articles and links to health websites. Pass the tissues. *—Lauren Brousell*

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